Catalogue of American Amphibians and Reptiles.

SANDERS, ALBERT E. 1984. *Rana heckscheri.*

Rana heckscheri
River frog

Rana heckscheri Wright, 1924:143. Type-locality, "Alligator Swamp, Callahan, Florida" (Nassau County, U.S. Route 23 "just north" of Callahan). Holotype, "A male 95 mm. long (Cornell Univ. No. 1025) taken August 18, 1922" by A. H. Wright et al., appears to be missing (see REMARKS).

• CONTENT. *Rana heckscheri* is a monotypic species.

• DEFINITION. A large frog averaging 90–120 mm snout to vent and reaching a known size of 155 mm (see REMARKS). Large males range from 110 to 120 mm SV and rarely exceed 130 mm; females attain 130–140 mm and reach 155 mm. There are no dorsolateral folds.

The lips are marked by conspicuous light spots, usually most prominent on the lower, often obscure on the upper. The lower edge of the upper lip is trimmed with dark pigment notched by the spots or their vestiges. The dorsum is blackish green and unmarked or greyish olive with a pattern of small, well separated dark markings of irregular, angular, or linear shape. Occasionally the markings are larger, more rounded, and interconnected. The venter is medium to dark grey or black with light spots or worm-like markings often resulting from a diffusion of the melanophores. The throat of the male is dark grey or black washed with yellow and frequently bears prominent yellow spots. A light girdle usually outlines the groin in both sexes.

The dorsal skin in both sexes is smooth to moderately rugose, most specimens exhibiting some rugosity. Occasional individuals and populations are very rugose, the skin heavily wrinkled by large, welt-like warts and ridges. Two parallel rows of elongate tubercles occur dorsolaterally in rugose animals but are poorly defined or absent in smooth-skinned individuals.

From hatching until about 20 mm total length the larva is black with a conspicuous gold band across the dorsum and has no pigment in the tail. Between 21–40 mm melanophores form along the crests of the tail and the gold band begins to disappear. At maturity (50–55 mm) the dorsum is dark olive covered with tiny, greenish yellow flecks, the venter purplish, and the tail boldly edged in black. The tail musculature has the upper half dark and the lower half light. The larva can attain 158 mm before the forelimbs appear but usually transforms at a lesser size in small bodies of water. There are two or three rows of labial teeth above and three below.

Newly-transformed individuals are 31–49 mm SV. The voice of the adult male is a rolling snore or an explosive grunt. The eggs have not been described.

• DIAGNOSIS. *Rana heckscheri* can be distinguished from *R. catesbeiana* and *R. grylio* by the presence of light spots on the lips and dark pigment along the lower edge of the upper lip, a dark venter with light markings, and a light girdle outlining the groin. In *catesbeiana* and *grylio* the venter is light with dark markings (often immaculate in *catesbeiana*), there is no light girdle at the groin, the upper lip is unicolor, and there are no spots on either lip. Young individuals of *Rana clamitans* often have light spots on the lips but also have well-developed dorsolateral folds not present in *R. heckscheri. Rana heckscheri* tadpoles are the only North American anuran larvae that remain in schools throughout the larval period. The bold, black edging along the tail of the tadpole is diagnostic.

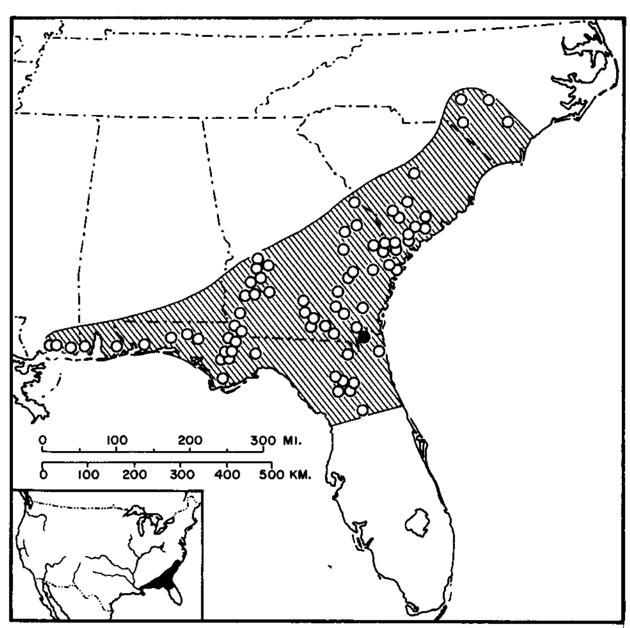
• DESCRIPTIONS. The best concise description of the adult is that of Conant (1975), who included previously undetermined diagnostic characters furnished by the present author. Wright (1924, 1932) and Wright and Wright (1949) gave extensive measurements and detailed color notes keyed to Ridgway (1912). Harper (1935) has provided the best description of a newly-transformed individual, the eye of which he reported as "golden bronze" in color, contrasting with observations by Wright (1932) and Wright and Wright (1949) that the eye in transformlings is "Sometimes brick reddish." The larva is described in Wright (1924, 1929, 1932), Wright and Wright (1949) and Altig (1970). A recording of the call of *heckscheri* (in a mixed chorus) can be heard on "Voices in the Night" (Anon., 1982) and on an album by Bogert (1958).

• ILLUSTRATIONS. Color photographs of *Rana heckscheri* can be seen in Behler and King (1979) and Martof et al. (1980). Conant (1975) provided a color illustration of *heckscheri* and drawings comparing the ventral markings of *heckscheri* and *catesbeiana.* Photographs of adults, larvae and larval mouthparts appear in Wright and Wright (1949). Noble (1931:320) furnished a drawing of a *heckscheri* tadpole showing the lateral-line system, but the model for this figure apparently was not a mature larva because the jugal row of lateral-line organs is not shown; the figure conforms to the general appearance of the *heckscheri* tadpole at about 55 mm TL. Harper (1935) provided a photograph showing the lateral-line system in a mature tadpole and included photographs of a newly-transformed individual. A photograph of a tadpole with all four limbs developed appears in Simmons and Hardy (1959). For additional photographs of adults see Wright (1932), Carr and Goin (1955) and Cochran and Goin (1970).

• DISTRIBUTION. *Rana heckscheri* inhabits Coastal Plain river swamps of the southeastern United States from the Cape Fear River drainage in North Carolina southward to northern Florida and westward along the Gulf Coast to the Biloxi River in Mississippi. A record for New Hanover County, North Carolina (DePoe and Funderburg, 1959), is based on *R. catesbeiana* (Cornell Univ. 5496), and Chamberlain's (1937) specimens from Causton's Bluff, near Savannah, Georgia, are *catesbeiana* (Charleston Mus. CA4219-4220). Unpublished records (Charleston Mus. CA4199-4215) establish *heckscheri* near the Fall Line in Sumter County, South Carolina. Neill (1947) found *heckscheri* near the Fall Line in Richmond County, Georgia, and important records from western Georgia were reported by Wharton et al. (1973). The Oklawaha River at Silver Springs, Florida, is the southernmost record (E. R. Allen, 1938). The first definite record from Alabama was reported by Mount and Folkerts (1968), and an unpublished record from Franklin Creek, Mobile County, Alabama (Univ. Alabama 71-3) places *heckscheri* in the Escatawpa River drainage. M. J. Allen (1932) recorded *heckscheri* from a tributary of the Tchoutacabouefa River near Biloxi, Mississippi, but an unpublished record (Tulane Univ. 17071) extends the range westward to the Biloxi River northeast of Gulfport. A deficiency of suitable habitat between the Biloxi and Pearl River drainages apparently forms an effective barrier against the distribution of this species westward into Louisiana.

• FOSSIL RECORD. None.

• PERTINENT LITERATURE. E. R. Allen (1938) reported on egg numbers, hatching period, larval ontogeny and mortality rates. Carr (1940) commented on transformation dates, survival potential, and



MAP. Solid spot marks the type-locality, circles indicate other localities, shaded area estimates total range.

the difference in temperament between adults of *heckscheri* and *catesbeiana*. Harper (1935) described the morphology and behavior of newly-transformed individuals and noted that the call of adult males heard in Georgia lasted approximately 1 second, with intervals of about 1.3 seconds between calls.

M. J. Allen (1932) called attention to the dorsolateral tubercle rows in a *heckscheri* adult from Mississippi and described the habitat of larvae taken near Biloxi. Parsons and Williams (1962) included *heckscheri* among anuran species having teeth with a division between crown and pedicel. Holman (1959) observed that the dorsolateral angle of the acetabular extension is usually more anteriorly directed in *R. pipiens, clamitans* and *palustris* than in *R. heckscheri, catesbeiana* and *grylio*. Herner and Frieden (1961) showed that during transformation the hemoglobins of larval *heckscheri* and *catesbeiana* are replaced by an electrophoretically distinct adult form of slower mobility than the larval hemoglobins. Jaeger and Hailman (1973) reported on phototactic responses of *heckscheri* and other adult anurans. Hansen (1952) discussed experiments with *heckscheri* and other male anurans as test animals for early pregnancy diagnosis.

Hansen (1957) also reported on the microhabitat, associated biota, area of home range, substrate and temperature preferences, and short-term growth rates in a Florida population of *heckscheri*. Neill (1961) noted the ingestion of a juvenile *Crotalus adamanteus* by a *heckscheri*. Goin and Ogren (1956) recorded the parasitic copepod *Argulus americanus* (Wilson) on a *heckscheri* tadpole from Florida.

• Remarks. Wright (1924) cited CU 1025 as the holotype of *Rana heckscheri*, but this number was occupied by a *heckscheri* tadpole from Mississippi. The Cornell collection contains no adult specimens of *heckscheri* from the type locality; the holotype apparently was lost or misplaced many years ago (F. H. Pough, pers. comm.). The Biloxi tadpole has been recatalogued and the number CU 1025 left open to accommodate rediscovery of the holotype.

Although it is not specified as such, the 95-mm specimen shown in Figures 5 and 6 of Plate 38 in Wright (1932) is clearly the holotype. The plate captions state that this specimen was taken at the type locality on 17 August 1922, but that date is obviously in error because the holotype, taken on 18 August 1922, was the only 95-mm specimen that Wright (1924:143, 147) took at the type locality. Figure 6 (Wright, 1932, Pl. 38) shows that the venter of the holotype was a perfect example of the ventral markings in this species.

Wright and Wright (1949) gave the maximum size of *Rana heckscheri* as 150 mm SV, evidently based on a Mississippi specimen reported by M. J. Allen (1932:11). However, Allen's specimen (Amer. Mus. Natur. Hist. 40267) actually measures only 101 mm, disclosing a discrepancy of unknown circumstance. At my suggestion, Conant (1975) gave the upper size limit as 135 mm, but a 155-mm female (American Mus. Nat. Hist. 101844) recently taken in Mississippi shows that *heckscheri* can exceed the maximum size given by Wright and Wright (1949).

• Etymology. *R. heckscheri* was named in honor of August Heckscher, benefactor of the Heckscher Foundation for the Advancement of Research, which supported much of A. H. Wright's work on this species.

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